Author's response to reviews

Title: Physicians' engagement in dual practices and the effects on labor supply in public hospitals: Results from a register-based study.

Authors:

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Author's response to reviews: see over
Dear Dr Gauld,

Re: Manuscript reference No. 1505450385111327 - Physicians' choices of dual practices and the effects on labor supply in public hospitals: Results from a register-based study.

Please find attached a revised version of our manuscript “Physicians' engagement in dual practices and the effects on labor supply in public hospitals: Results from a register-based study”, which we would like to resubmit for publication as a research article in *BMC Health Services Research*.

After reconsidering our methods as a response to the reviewer’s comments, as well as external text editing, there are rather extensive revisions in the manuscript text, and they are shown using the track changes tool. We hope that our revisions and accompanying responses are sufficient to make our manuscript suitable for publication in *BMC Health Services Research*.

The comments of the reviewers were highly insightful and enabled us to greatly improve the quality of our manuscript. In the following pages are our point-by-point responses to each of the comments of the reviewers.

We really appreciate the thorough evaluation of our work and the many interesting comments. We started out by trying to comment on every issue that was mentioned by the three reviewers, but ended up with a document of 31 pages.

We have therefore chosen to respond in the following way:

Some of the phrasings that the reviewers suggested to change have hopefully been responded on by the editing proves that we obtained through an external partner. We interpret the major and compulsory revisions from the three reviewers as having several common issues:

- Clarification of the study population and study data.
- Better definition of public salary and working hours, ‘dual practice’ and how salary data from such activity as well as socioeconomic data are specified.
- Major statistical issues from Reviewer 3. Regarding the comments of Reviewer 3, we particularly focused on the following important issues: too complicated statistical approach with four different analyses (Balanced versus unbalanced), and the use of two differing statistical methods (GEE and GLMM panel analysis).
Thus, we provide a number of comments to these major themes in the first part of our response, and thereafter we describe in detail how we have responded to the major revisions suggested in the manuscript.

We hope that all unclear or ambiguous language and formulations have been improved after language editing from an external publisher partner.

Introductory responses
We started this study with the hypothesis that physicians in a balanced study (working throughout the entire study period 2001–2009) would demonstrate different factors from a population of physicians comprising all doctors (‘coming and going’). After our revised statistical analysis, we realize that this hypothesis provides little additional value but contributes to a rather complex presentation of the manuscript as mentioned by Reviewer 3. We fully agree with Reviewer 3 that a question that has public health relevance should be answered in a way that people in the public health sector can read and understand. Our intention in our revision is to respond to this.

Regarding the description of the study group
We removed the focus on unbalanced versus balanced and now only include the total number. We have, after our last revision, also excluded physicians that worked after pension age, and the total study group is now 12,399 physicians.

Study group

_All 18,888 physicians who held a position in Norwegian public hospitals between 2001 and 2009 were considered for the study. We included physicians that had worked at least two years in public hospitals following graduation. To work as an independent physician in the private sector (and thus engage in dual practice), it is mandatory to be fully licensed as doctor, and this requires 18 months of intern service. Because of a lack of socioeconomic data, we excluded physicians who did not have a Norwegian social security number (usually short-term workers and those with incomplete data in public databases of social factors). Physicians above 67 years (the pension age) are excluded from the analyses. Using these criteria, the number of physicians in our sample ranged from 6,820 physicians in 2001 to 9,808 in 2009. In total, our sample consisted of 12,399 individual physicians._

Data sources

_We linked data from three different registers. Data of salaries and hospital working hours for each physician in each year (2001–2009) were obtained from The Employers Organization Specter, which annually reports such data to Statistics Norway. Data regarding nonhospital income and individual characteristics as cohabiting status and number of children were obtained for each physician in each_
year from Statistics Norway. To combine these two data sets we transferred the individual physician data from the Specter database to Statistics Norway, which linked the data and returned them as anonymous code.

Regarding ethical perspectives:

According to Norwegian regulations, the study did not require approval by The Norwegian Data Protection Authority or The Regional Committees for Medical and Health Research Ethics, but the study was subject to notification as required under the Norwegian Personal Data Act. Notification was submitted to the Norwegian Social Science Data Services (NSD) on 5 May 2008 (project number 19192).

Public wages for extended working hours

The Salary for extended working hours is based on national regulations and is calculated as 0.08% of the individual’s total regular annual salary. The hourly wage is related to position, experience, and education (e.g., PhD), and amounts to approximately twice the basic hourly wage.

Physician net capital income and income from dual practice.

Individual-level economic data from Statistics Norway included total taxable income, total debt, total interest costs for loans, total income from savings, and income from nonhospital activity for each year. We calculated the net capital income (NetCapInc) as the sum of interest from savings and from total debt.

We no longer use GEE for odds ratio; instead we use GLMM for both odds ratio (as recommended by Reviewer 3) and our panel analysis of public working hours.

Our analyses are further simplified by eliminating the balanced analyses.

Analytical approach and statistics

Between group analyses were done by Wilcoxon two-sample test. The odds ratio of engaging in dual practice was analyzed using Generalized Linear Mixed Models (GLMM) with a binary response distribution and a logit link function. We used fixed effects for hospital and specialty to control for differences between specialties in some of the specifications. The statistical set up is inspired by previous economic analyses of physicians’ labor supply including those of Sloan, Noether, Rizzo and Blumenthal, and Baltagi et al. [24-27]. Our estimated models were derived from the life-cycle model and account for former income from work and capital by including lagged versions (values from previous year) of these variables. The regression equation of Dual practice (footprints for time are suppressed):

\[
\text{Dual practice} = \alpha + \alpha_1*\text{Salary for extended working hours(lag)} + \alpha_2*\text{NetCapInc(lag)} + \alpha_3*\text{IndAtt} + \alpha_4*\text{Hosp} + \alpha_5*\text{Waiting time} + u + y + sp + e
\]
where NetCapInc is the sum of capital income and expenses, IndAtt refers to individual characteristics such as gender, age, and marital status. Age is categorized as follows: Age group 1 <35 years, 35<= age group 2<45, 45<= age group 3<55, 55<= age group 4<68. Age group 4 serves as reference category. Hosp refers to hospital characteristics as Workload, FTE physicians and Nurses per bed. We included dummies (fixed effects) that were specific to each health enterprise (uhe), year (y), and specialty (sp).

The regression equation for total weekly working hours:

\[
\text{Total Weekly Working Hours} = b + b1*\text{Salary for extended working hours (lag)} + b2*\text{NetCapInc (lag)} + b3*\text{IndAtt} + b4*\text{Hosp} + b5*\text{Area} + \text{DualPractice} + \text{uhe} + y + sp + e ,
\]

where DualPractice describes whether the physician has dual practice or not (dual practice = 1, no dual practice = 0).

The fixed-effects analyses imply that we utilized the variation between individuals within each health enterprise, year, and specialty. We assumed all remaining errors to be white noise (e). Dummies for health enterprises will, for example, capture the effect of the hospital hierarchy. We analyzed the dataset as unbalanced.

Below you will find our responses to the reviewers’ specific comments.

We look forward to hearing from you at your earliest convenience.

Yours sincerely,

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Responses to the comments of Reviewer #1

Reviewer: Krishna Hort

- Major Compulsory Revisions

Background: (1) Para 6, last line: ‘effects of dual practices on the labor supply in public hospitals?’ This is an incomplete question and suggests that some lines are missing, perhaps describing the aim and objectives of the study. Please add a specific description of the aim and objectives.

Response: The incomplete sentence was an unfortunate mistake, and has been removed. We have tried to clarify the aim and objectives as follows:

The aims of the current study are twofold. We first examine those factors that affect a physician’s decision to engage in dual practice. Second, we analyze how the engagement in dual practice affects the number of weekly working hours in public hospitals. We implement the analysis using a general model of physician labor supply where socioeconomic factors such as income and family structure and hospital specific factors such as physicians’ workload are allowed to affect dual practice and total working hours in public hospitals.

Materials and Methods (2) Para 2, lines 1 -2 : You refer to ‘samples extracted from a population’. I assume you mean from a register or database of the population of physicians. Please describe the database – how were the data collected, who manages the data base, what was the data collected for, whether identifying information was available, and if so, what ethical clearance was obtained.

(3) Para 2, line 10: Please explain how the ‘sample’ of 14,033 physicians has more than 16,800 from the sum of 2001 and 2009 (line 10). I assume the database consists of the number of physicians employed each year, but is the unit physician (and includes years worked); or is there a separate list of physicians for each year.

Response: This has now been rewritten in Materials and Methods para 1. Please see above.

(4) Para 3: This section needs to describe the other databases in more detail – as mentioned above under the database of physicians. In particular how were the databases ‘merged’? Do the other databases have data by individual physician? If so how were the individual physicians identified? What is the database referred to from ‘Statistics Norway’? If the merger required identifying information at an individual physician level, this again requires some ethical explanation.

More information is needed on the ‘hospital variables’ (5) Para 4: Identifying physicians engaged in dual practice is a key aspect of the study. Please provide more information on which database was the source of the information on income (I assume Statistics Norway), and how complete / accurate this information is eg is it from income tax reporting? Does
Response: The above comments are considered in the following paragraph:

Data sources

We linked data from three different registers. Data of salaries and hospital working hours for each physician in each year (2001–2009) were obtained from The Employers Organization Specter, which annually reports such data to Statistics Norway. Data regarding nonhospital income and individual characteristics as cohabiting status and number of children were obtained for each physician in each year from Statistics Norway. To combine these two data sets we transferred the individual physician data from the Specter database to Statistics Norway, which linked the data and returned them as anonymous code.

Regarding ethical perspectives:

According to Norwegian regulations, the study did not require approval by The Norwegian Data Protection Authority or The Regional Committees for Medical and Health Research Ethics, but the study was subject to notification as required under the Norwegian Personal Data Act. Notification was submitted to the Norwegian Social Science Data Services (NSD) on 5 May 2008 (project number 19192).

Para 6: Again need to clarify whether the hourly wage is calculated on an annual basis. More clarification is needed on the calculation of ‘extended working hours’ – how is the percentage of the physician’s salary defined / measured?

Response: We have tried to clarify this in the following paragraphs:

Total weekly working hours: the wage system for hospital physicians defines the standard basic weekly working hours to be 35.5–40.0 hours, which are fairly constant over time. In addition, doctors may voluntarily work extended hours each week on a regular basis (negotiated individually) and typically varying from 0 to 10 hours per week. Although these hours are usually stable over time, we recorded this variable each year for each individual physician. These two components make up the total planned working hours per week for each physician. Total weekly working hours also include casual overtime work,
which may have monthly variations. Total weekly working hours describe the average total labor supply each week across the year.

(8) Para 6 line 13: I am unable to understand the reference to ‘instrumented the endogenous variables..by their previous values’. The variable ‘NetCapInc’ has not been defined. This needs to be explained and re-written.

Response: We have simplified our analysis, please see above.

NetCapInc:

Individual-level economic data from Statistics Norway included total taxable income, total debt, total interest costs for loans, total income from savings, and income from nonhospital activity for each year. We calculated the net capital income (NetCapInc) as the sum of interest from savings and from total debt.

The figure (figure 3) is labelled NOK on the vertical axis – this needs to be defined (? Norwegian currency)

Response: This is now defined.

Discussion (12) Para 3: Hourly salary for extended working hours. Please clarify the policy change. Were physicians in public hospitals allowed to work extended hours and receive additional salary ? or was payment made for extended hours (previously did physicians receive no payment for extended hours) ? or was payment rates increased ?

Response: Please see the two relevant paragraphs in the Discussion:

This salary rate was instituted in 1996 specifically to increase physicians’ willingness to work extended hours to ensure a sufficient labor force in hospitals. Our findings may indicate that the effect of this action has been successful and is lasting over time. It supports the findings reported in other Norwegian studies [7, 28].

... 

In 1996, to possibly tackle a brain drain from public to private hospitals, a targeted increase in salaries for extended working hours and overtime work resulted in a substantial salary increase for physicians working in public hospitals. A study of that event indicated that the salary increase of 11% increased the physician labor supply to public hospitals and reduced physician dual practice [7].
**Reviewer's report - 2**

Reviewer: Matthias Nachtnebel

**Major Compulsory Revisions**

1- Methods, para 3: it’s absolutely not clear to me where the information of debts/loans is coming from. This is a very private and sensitive information- probably not recorded in registry.

   **Response:** This information is in the Statistics Norway registry and was included in our data. It is sensitive information, but we have now explained how we obtained this information above.

   We linked data from three different registers. Data of salaries and hospital working hours for each physician in each year (2001–2009) were obtained from The Employers Organization Specter, which annually reports such data to Statistics Norway. Data regarding non-hospital income and individual characteristics as cohabiting status and number of children were obtained for each physician in each year from Statistics Norway. To combine these two data sets we transferred the individual physician data from the Specter database to Statistics Norway, which linked the data and returned them as anonymous code.

   **Regarding ethical perspectives:**

   According to Norwegian regulations, the study did not require approval by The Norwegian Data Protection Authority or The Regional Committees for Medical and Health Research Ethics, but the study was subject to notification as required under the Norwegian Personal Data Act. Notification was submitted to the Norwegian Social Science Data Services (NSD) on 5 May 2008 (project number 19192).

   Individual-level economic data from Statistics Norway included total taxable income, total debt, total interest costs for loans, total income from savings, and income from non-hospital activity for each year. We calculated the net capital income (NetCapInc) as the sum of interest from savings and from total debt.

2- Methods, para 7: is lagging a variable really the same as an instrument? (I have to apologise if I am mistaken due to lack of knowledge) but to my knowledge an instrumental variable is something different. Also the explanation why the authors did this is not comprehensible to me. Also the statement that this resulted in valid instruments seems to require some justification and belongs probably into the results section.
Methods, para 7: Did the authors check for remaining endogeneity?

Response: Our analysis is simplified, and we hope that this has been dealt with above.

4- Methods, para 10: please explain methodology on private activity- not clear; and where is this variable in the analysis/ models? It seems as this methodology would rather reflect utilisation of health care then demand.

Response: Unfortunately, this was a phrasing from a previous draft that should have been deleted before we submitted the manuscript. We previously had done some analyses where private activity was included in the previous GEE and GLMM, but had to realize that the allocation of private DRGs did not have a precision that was reliable. This is therefore not included in GLMM analyses, and we are therefore left with the national presentation of total private activity versus the total dual practice among all physicians (Figure 4). This has been rewritten as follows:

Activity data for both the public hospitals and private providers consist of the total number of annual DRG activity for hospital stays, day treatments, and outpatient treatments. We recorded mean waiting times within each hospital region as variables reflecting the excess health care demand.

5- Methods, para 10: How about income in the private sector? Where is this variable? Some information on the health market?

Response: Please see our related responses (8) to Referee 1 above.

7- Results, para2: it seems to be of interest to describe private practice and trend as related to policy changes implemented in 2005. Did policies of 2005 actually change the health market? Were for instance different services paid which might also explain DP probability??

Response: We have tried to comment on this in the Results as follows:

From 2005 to 2007, the mean waiting times increased by 10%–35% in the differing regions. However, the extent of dual practice fell in the same period and there were no correlation between waiting times and odds ratio for dual practice in the multivariate analysis.

8- Results, para 3: Is it possible that DP and Netcapinc are characterised by reverse causation? For instance DP requires private practice which is financed via tax saving long term loan?
Response: Most DPs are not financed in this way. We have no indications that this should be the case. We interpret the results as stating that physicians with more loans chose dual practice to cover their personal costs.

9- Results, para 4: it is not obvious to me why you didn’t include specialty in the DP probability model?

Response: This was an important and useful comment and we have included specialty in the GLMM. We now use dummy variables to perform fixed effect analysis to control for the variation in differing specialties (as well as health enterprises).

10- Discussion, para 4: the authors write that DP in some specialties is probably caused by long wait lists- yet previously they stated that results showed the opposite effect

11- Discussion, para 7: No evidence of increase waiting list?? Contradiction to statement on one page before

Response: We have tried to clarify these two comments as follows:

However, in particular specialties such as otolaryngology and ophthalmology, we found significant higher dual work incomes than in other specialties, and in these fields, the dual workers definitely worked less in the hospitals than their non-dual working colleagues. This significant variation between differing specialties may be associated with several facts. Our main hypothesis, however, is that financing for private services in these two specialties has been particularly abundant. This was instituted long before our study period as a governmental response to persistently long waiting lists for these patient groups over the decades.

...

In the conclusion we state:

The most important corollary therefore seems to be that care should be taken when making general conclusions regarding dual practice based on studies of particular medical fields. And vice versa, conducting studies on a macro level may miss particular specialties of interest and concern. Our conclusion is that dual practice should be analyzed in a broad context and not from a narrow perspective.

12- Conclusions, para 2- Last sentence: the authors write that irrespective of setting it must be governed by transparent and clear rules etc. How is this claim substantiated by results? Authors previously write that Norway has no DP regulation and yet DP is decreasing with the outcome of an increased labour supply. If this is the case that would be rather an argument for no regulation, or am I mistaken?
Response: We agree that this issue was not analyzed in our study and we have deleted it from our conclusions.

Reviewer's report - 3

Response: This reviewer focused on our statistics. In response, we have made numerous changes after consultation with a biostatistician. We believe that several of the essential compulsory revision issues 1-9 have been answered above.

We have simplified the manuscript both by leaving out the balanced analysis as explained above, because this offered little additional value, and by using only GLMM as this reviewer suggested.

The background information for this article seems to suggest it addresses the potential negative impact of dual work by physicians on the public health services of Norway. It also suggests (and I think this is more likely the case) that it looks into the characteristics of the physicians (and their working lives) who undertake dual work. I think it would be helpful to describe explicitly what the aims of the study are.

Response: We have changed our phrasing to:

Abstract:

Physician dual practice, a combination of public and private practice, has attracted attention due to fear of reduced work supply and a lack of key personnel in the public system, increase in low priority treatments, and conflicts of interest for physicians who may be competing for their own patients when working for private suppliers. In this article, we analyze both choice of dual practice among hospital physicians and the dual practices’ effect on work supply in public hospitals.

Background:

Aim and objectives

The aims of the current study are twofold. We first examine those factors that affect a physician’s decision to engage in dual practice. Second, we analyze how the engagement in dual practice affects the number of weekly working hours in public hospitals. We implement the analysis using a general model of physician labor supply where socioeconomic factors such as income and family structure and hospital specific factors such as physicians’ workload are allowed to affect dual practice and total working hours in public hospitals.
I am concerned that the aims of the study have been lost in the complicated analysis and description of the statistics. I would have thought that a question that has public health relevance should be answered in a way that people in the public health sector can read and understand. I do not think that is the case with the way this paper is presented, currently. I have a strong background in statistics and I find it hard to get a clear picture of what these authors have actually done and what their rationale is for their statistical decisions.

Major Compulsory Revisions:

1. I cannot understand what you mean when you describe the probability of having dual work 'ProbDual'. The reason I think it is important to get this definition clear is because it underpins the modelling and the inference that you later do. It is defined in paragraph three of Materials and Methods as ‘the odds ratio for scoring 1 on a dichotomous variable in logistic regression (0 = not engaging in dual work, 1 = having dual work)’. Is it the odds ratio or is it the logit? If it is the odds ratio, it cannot be put directly into the GEE as the outcome. If it is either the odds ratio or the logit, it is not measuring the probability of having dual work.

   Response: As explained above, we have exchanged GEE analysis with GLMM and logit function. As the reviewer comments, it is not a probability but the odds ratio that is estimated. We believe that this is consistently used in the manuscript now.

2. It is not clear to me what the benefit is of using the two different subsets of the data in terms of addressing the aims of the study. This point needs to be clarified.

   Response: We fully agree with the reviewer, and as stated above, we only use the unbalanced group.

3. The description of the data (paragraph two of Materials and Methods) says ‘we used two samples extracted from a population of 18,888 physicians’. Do you mean that the combined registers recorded 18,888 physicians and that two different subsets of the data were used for the analyses? Is every physician in Norway present on these registers? I think it would be beneficial to clarify this statement and to give some idea of any potential bias (if any) that may exist from these data sources.

   Response: We believe that our current phrasing as stated above clarifies this.

4. There are three types of modelling employed. It is essential that the authors describe clearly why it was necessary to use these three types of models to answer the questions under consideration. It seems, on the face of it, to be overly complicated and I have found it hard to follow what exactly the authors are doing and why.

   Response: We fully agree with the reviewer, and we have concluded that the three models caused unnecessary complexity and very little added value. As stated above, we have simplified the analysis.
5. Life-cycle models come from the economics literature (so not my area of expertise). In everyday terms, what is meant by ‘where the actors maximize the lifetime sum of discounted utility derived from consumption, leisure and some individual attributes.’ (paragraph eight of Materials and Methods)?

I do not see the need for the specification of these models in terms of mathematical formula when this has not been done for the other types of models, and the information contained in those formulae are not used elsewhere in the paper. If you must include those formulae, you need to say what the subscripts denote (as well as the individual terms). It is not clear to me how these models address the research question (which has not been clearly stated).

Response: We believe that some kind of formula should be presented, but we have simplified them and omitted the subscripts (please also see above):

The odds ratio of engaging in dual practice was analyzed using Generalized Linear Mixed Models (GLMM) with a binary response distribution and a logit link function. We used fixed effects for hospital and specialty to control for differences between specialties in some of the specifications. The statistical set up is inspired by previous economic analyses of physicians’ labor supply including those of Sloan, Noether, Rizzo and Blumenthal, and Baltagi et al. [24-27]. Our estimated models were derived from the life-cycle model and account for former income from work and capital by including lagged versions (values from previous year) of these variables. The regression equation of Dual practice (footprints for time are suppressed):

\[
\text{Dual practice} = a + a1*\text{Salary for extended working hours}(\text{lag}) + a2*\text{NetCapInc (lag)} + a3*\text{IndAtt} + a4*\text{Hosp} + a5*\text{Waiting time } + uhe + y + sp + e
\]

where NetCapInc is the sum of capital income and expenses, IndAtt refers to individual characteristics such as gender, age, and cohabitating status. Age is categorized as follows: Age group 1 < 35 years, 35 <= age group 2 < 45, 45 <= age group 3 < 55, 55 <= age group 4 < 68. Age group 4 serves as reference category. Hosp refers to hospital characteristics as Workload, FTE physicians and Nurses per bed. We included dummies (fixed effects) that were specific to each health enterprise (uhe), year (y), and specialty (sp).

The regression equation for total weekly working hours:

\[
\text{Total Weekly Working Hours} = b + b1*\text{Salary for extended working hours (lag)} + b2*\text{NetCapInc (lag)} + b3*\text{IndAtt} + b4*\text{Hosp} + \text{DualPractice} + uhe + y + sp + e
\]

where DualPractice describes whether the physician has dual practice or not (dual practice = 1, no dual practice = 0).
The fixed-effects analyses imply that we utilized the variation between individuals within each health enterprise, year, and specialty. We assumed all remaining errors to be white noise (e). Dummies for health enterprises will, for example, capture the effect of the hospital hierarchy. We analyzed the dataset as unbalanced.

6. The mixed models are described in the paper as ‘a mixed model approach with fixed effects’ (paragraph nine of Materials and Methods). The outcome is ‘PublHours’. Are there any random effects in this model? If so, it should be stated what they are. I imagine they could be either physician or hospital. If there is no random effect, there is no need to fit a mixed model. What data are these models applied to and why? I know the tables imply that it is to both the balanced and unbalanced panel data, but it would be good to have more information about that written in the text. There is also little opportunity to see what these models are. That is, what terms exactly are included and why? I notice, in Table 3 where, I presume, you are reporting on the mixed models there are interaction terms listed. There should be information provided on how the decision was made to include or not include the interaction terms in these models? References should be provided for this methodology.

Response:

In a previous study, we found that gender and family variables have significant effects on physicians labor supply. This was our argument for investigating these effects also related to dual practice, and we have stated this:

Based on earlier analyses of significant gender effects on labor supply [23], we also analyzed the effects of gender on dual practice and therefore included interaction terms between gender and Children < 18 years, ChildLastYear, and cohabiting status.

7. The description of the GEE part of the analysis in paragraph ten of Materials and Methods is ‘The probability of engaging in dual work (ProbDual) was analyzed using Generalized Estimating Equations (GEE) with logistic regression’. I am not sure why these are used in preference to mixed models when mixed models can also be set up to have a dichotomous dependent variable and they can account for correlations between observations. I wonder if it is possible that GEEs handle the missing observations differently to mixed models. I imagine with the balanced data this would not be an issue. Is the random effect, in this case, individual physician? The comment that you can allow for correlations between individuals suggests that this is the case. As with the mixed models, you need to explain how you decided to include or not include your interaction terms (Table 2). Again, you should include references for this method?

Response: We assume this has been responded on by the fact that we have exchanged GEE with GLMM as described above.
8. The only results you report (which, presumably are the most important ones) in the Abstract are those on dual work and what factors impact on the probability of engaging on dual work. There is no mention on work hours or the different subsets of the data – it makes me wonder if you need those separate analyses.

Response: We have rephrased the Abstract:

The percentage of physicians engaged in dual practice fell from 35.1% for men and 17.6% for women in 2001 to 25.0% and 14.2%, respectively, in 2009. For both genders, financial debt and interest payments were positively correlated and having a newborn baby was negatively correlated with engaging in dual practice. Larger family size and being cohabitating increased the odds ratio of dual practice among men but reduced it for women. The most significant internal hospital factor for choosing dual practice was high wages for extended working hours, which significantly reduced the odds ratio for dual practice. The total working hours in public hospitals were similar for both those who did and did not engage in dual practice; however, dual practice reduced public working hours in some specialties.

We have also tried to focus on the perspective of doing such studies in an adequate context in the Conclusion of the Abstract:

Economic factors followed by family variables are significant elements influencing dual practice. Although our findings indicate that engagement in dual practice by public hospital physicians in a well-regulated market may increase the total labor supply, this may vary significantly between medical specialties.

9. I think this article would benefit from the collaboration of a biostatistician.

Minor Essential Revisions:

1. I don’t understand how that 14,033 works in terms of the longitudinal data. In the manuscript you say ‘ranging from 6,820 in 2001 to 10,041 in 2009’ (paragraph two of Materials and Methods). It might be helpful to describe somewhere what the numbers are for each year.

Response:

Since we have removed the balanced issue in the study, we hope that the new phrasing presented above responds to this.

2. Results Section: It is hard to follow all the results within the 6 figures and 3 tables. I can’t help but think that the amount of information could be reduced.
Response: *We have removed one figure and have simplified the tables by omitting the balanced group.*

3. I don’t think it is helpful to list the variable names in the tables. The information there should stand alone without it being necessary to refer back to the text. You should say what the dependent variable is in each case. Is it necessary to include maximums and minimums in Table 1? Some of the variables in this table would be better off with a median reported (like debt, for example, because it likely to be skewed). What is the mean of the ‘mean position fraction’? ‘Percent married’ is, presumably, not a mean. I think this table could be more clearly presented.

Response: *We now use the full names of variables so it is not necessary to refer back to the text, and use median instead of mean.*

4. Table 2: I don’t understand the caption ‘Probability of having dual work by odds ratios...’. Are these probabilities or odds ratios? If they are probabilities, why are some greater than 1? If you have used a form of logistic regression, it is customary to report the odds ratios and their 95% confidence intervals. You should use your understanding of the context to inform what associations are of interest. Because your sample is so large, you are likely to have many significant results using p-values.

Response: *This is hopefully responded on by the text above.*

5. Table 3: What are these effects? You have described your data as balanced and unbalanced panel data. So when you say in the title ‘Estimates from panel data analyses’, couldn’t that be from any of the models? It is more useful to present effect sizes and their 95% confidence intervals rather than p-values (as mentioned earlier). I don’t understand at the bottom of the table you have listed some fixed effects. Aren’t all the variables in the table in the models? Wouldn’t all of them be fixed effects? I am very confused on that point.

Response: *We now use confidence intervals instead of p-values.*

We present only two models following the same principle for odds ratio and total working hours; results without (no dummy variables) and with fixed effects (dummy variables for hospital and specialty). We believe this demonstrates that without considering possible differences across institutions and specialties, one may miss important information.

6. In paragraph 5 of the results you talk about probabilities, but then you switch to odds and odds ratios in the next paragraph. This is confusing.

Response: *We now just use the term ‘odds ratio’.*

7. Paragraph eight of the results. Are you talking about the life-cycle models or the mixed models? If you are not using a random coefficient model, presumably you are using a
random intercept model (if it is a mixed model). By ‘lagged dependent variables’, do you mean that you are including baseline measures of 'PublHours', or all previous years values? If these are the life cycle models, perhaps you should define t (from the model, earlier described). In that case, the lagged variable is just the previous time period (presumably year).

Response: Please see above.

We explain what we mean by lagged variable:

Our estimated models were derived from the life-cycle model and account for former income from work and capital by including lagged versions (values from previous year) of these variables.

8. There is a lot of jargon used where I would prefer plain English descriptions. For example, ‘negative predictors’ and ‘lagged variables’. When it comes to discussing your results and your finding, you need to use language that non-statisticians (and non-health economists) can understand.

Response: We have rephrased ‘negative predictor’ to:

The most striking hospital variable that correlated to the choice of dual practice was the wage level for extended work in the public hospitals, which reduced the odds ratio significantly.

Discretionary Revisions:

1. I notice at the end of the section called Background there appears to be an incomplete sentence (‘effects of dual practices on the labor supply in public hospitals?’)

Response: Corrected

2. In paragraph four of Materials and Methods, you describe the hourly wage – is that 'NetCapInc'? It does not appear to be named there.

Response: Corrected

3. Figure 3 seems to me to be about debt (given its place in the text) but the legend says it is about mean working hours. I think this is a mistake.

Response: Table 3 deleted.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable